

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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THE MINERAL INTERESTS IN THE NEW PARLIAMENT.

The great parliamentary struggle is now over—the event which caused so much excitement and agitation throughout the length and breadth of the land, interfering with every department of trade and commerce, has passed. For weeks the three kingdoms have been engaged in the heat of contested elections, as severe as any that have occurred for centuries past. Previous to the elections we deemed it our duty, as the exponent of the iron, coal, and other staple trades of the kingdom, to direct the attention of the electors, and especially those engaged in the staple products of the kingdom, to the imperative necessity which existed that there should be a more full and complete representation of the iron and coal trades in the new Parliament than existed in the old. There cannot be a doubt that the present is a critical period in the history of these great interests, as well as in that of other large manufactories, upon which England's commercial status has been built, and to which in a great measure she is, and must be, still beholden, if her standing, commercially speaking, is to be maintained amongst the first nations of the world. There is not only a more keen and spirited competition now existing between England and Continental and American States in the production of the raw material, and in the various manufactures, but there are many matters connected with the working of our collieries, and the management of our iron works, which require careful supervision and amendment, and which supervision and amendment should be considered and dealt with by sound practical men, rather than by mere tyros, or, worse still, by those who have not even the most superficial knowledge of the matters which they are called upon to decide. The necessity of more thoroughly practical men as representatives of the coal and iron trades in the Imperial Parliament is generally admitted, even by those who have no immediate interest in the trades; and we question much whether any branch of the service, or any large commercial or manufacturing industry, has felt the necessity of more complete representation than has those trades whose interests it is our special duty to protect and to endeavour to advance.

But the selection of those who have to guide the destinies of this great and flourishing nation for several years has now been made; and now that the excitement and agitation consequent upon the elections have passed we can take a calm and dispassionate review of the event, so far as regards the representation of the mineral interests in the new Parliament. Aeschewing all political sentiments and opinions, we have nothing to do with the question now most prominent before the country, and upon which the election, generally speaking, has been fought. Our great object and desire has always been to show that the owners of extensive collieries, the proprietors of gigantic iron works, or large copper-smelting works, must necessarily have a practical knowledge of the many requirements essential to still keep these establishments upon a firm basis; and having very large amounts of capital invested in their works, they will naturally watch jealously all attempts at undue interference, and will strive to protect their interests from unnecessary restrictions and trammels; whilst, having thousands of men directly dependent upon them for support, they, by their constant intercourse with those in their employ, know the many wants of the men, and are enabled to carry out measures which would be productive of lasting benefits to both employers and employed. Such being the case, gentlemen so connected, and having such large practical knowledge, are of all others the most fitted for the discharge of those duties, the framing of those important measures, and the consideration of those questions which so vitally affect their interests, and upon which the stability of the country so much depends. And, regarding the elections as a whole, there is reason to feel satisfied with the result, although we candidly confess there are one or two losses from the ranks of the mining interests whose absence from their seats in Parliament all must regret, and whose labours and exertions will unquestionably be greatly missed. Still, new blood has been infused into the representation of our mining interests—gentlemen of undoubted talent, large practical experience, indomitable perseverance and energy; and last, though by no means the least important consideration, good public speakers and debaters, will sit for the first time in the new House, and their talents and energy, as well as their votes, must have very material influence upon those questions which affect the management of collieries or iron works, factories, and large manufactories generally.

Looking at the result of the elections, we are glad to find that several gentlemen who held seats in the old Parliament, and to whom the mining world is so much indebted for the zeal and ability displayed by them in furthering and protecting the interests of our staple trades, will retain their seats in the new Parliament.

As far as the limits at our disposal this week will allow we have reviewed, from what may be termed a mining and metal stand-point, the election returns from the leading centres of these branches of our national industry in England and Wales. Places not now noticed will be taken up hereafter.

NORTH DURHAM.—The contests in the North have, in conspicuous instances, been severe. We speak in a trade sense. In this respect the remark made by the Right Hon. W. E. GLADSTONE, who attributed the presence sometimes of several Liberals contesting for a seat to the superabundance of Liberal sentiment, is equally applicable to the struggles in which the *Mining Journal* has taken most interest. Trade members have opposed trade members because the modern development of our mining and manufacturing industries has produced us giants in these, no less than in former days. This has nowhere been more conspicuous than in the North, where may still be found men who are worthy successors of him who gave us the "Geordie," and who made for his own locomotive an iron way across Chat Moss. To what other cause can we attribute the fact that GEORGE ELLIOT and ISAAC LOWTHIAN BELL should have struggled for North Durham? It is otherwise greatly to be lamented that two such men, each possessing extensive experience in the management of great commercial undertakings, should have been found seeking a position which both knew that only one could occupy. They themselves con-

tested, and their respective friends supported them, with the native perseverance of the hardy Northmen. Mr. ELLIOT was ultimately the victor, and he will be welcomed in the House of Commons upon every hand. The supporters of Mr. BELL need not regret that their favourite has been beaten by a man who, like their own STEPHENSON, has risen to a position of which they may all be alike proud. Mr. ELLIOT has proved himself a "power" in the business world, and he will be no less so in all trading matters in the world of legislation. As this gentleman is so well known in the mining and scientific world, any remarks as to his ability and fitness to discharge the onerous duties which will devolve upon him in connection with his parliamentary life would be superfluous. From the most humble ranks Mr. ELLIOT has worked his way onward and upward to his present high and honourable position, his energy and perseverance surmounting obstacles and overcoming difficulties which would have baffled and daunted many men. His whole life has been devoted to the advancement of the interests of mining and engineering, and in each of these departments he has rendered valuable aid. His many speeches upon these matters are not only full of interest, but full of information, and can be read with much benefit to all. He has recently been elected President of the North of England Institute of Mining Engineers, and his remarks to the members of that society, a few weeks since, in reference to our collieries display much practical knowledge and scientific research. This gentleman must, therefore, be a great authority upon these matters, and his opinions will unquestionably carry a weight and importance which cannot fail to be of the greatest service.

SOUTH SHIELDS.—The contest for the borough of South Shields is equally demonstrative of the embarrassment which has resulted from our wealth in excellent mercantile candidates. Here Mr. CHARLES MARK PALMER, the eminent iron shipbuilder and ironmaster, strove with Mr. JAMES COCHRANE STEPHENSON, the famous chemical manufacturer of that part of the kingdom, and Mr. STEPHENSON won the prize. In this, as in some other contests, we could well have desired that the position of the accepted and the rejected had been reversed; but if the new member for South Shields is not purely a representative of the mining and metal interests he will, nevertheless, prove a most valuable addition to the trade strength of the new House.

GATESHEAD.—Gateshead once more sends up Sir W. HUTT, who was Vice-President of the Board of Trade, is largely interested in the coal and shipping trade of the port, and has been its member for a quarter of a century.

NEWCASTLE.—For Newcastle Mr. J. COWEN, who was first elected in 1865, again finds a seat with Mr. H. E. HEADLAM. Mr. COWEN is a coalowner as well as a manufacturer of fire-bricks and the like.

THE HARTLEPOOLS.—The Hartlepoons, represented for the first time, have returned Mr. RALPH WARD JACKSON, who we stated in the *Mining Journal* of Oct. 24 (page 758) has been of immense service to that borough in the development of its dock and harbour capabilities, and he is spoken of as "the founder of the port and town." We could well have desired Mr. RICHARDSON, but, nevertheless, give a hearty welcome to Mr. JACKSON, who, 62 years of age, possesses experience as a merchant which this nation eminently needs of her senators.

MIDDLESBOROUGH.—The new borough of Middlesborough is represented by Mr. H. R. BOLCKOW, who, born and educated in Germany, nationally qualified himself for a seat in the British House of Commons by special legislation; but as a trade representative he was abundantly qualified by reason of his position as the chief member in the firm of Messrs. BOLCKOW and VAUGHAN, who have been well styled the chief founders of the trade of Middlesborough. The position which Mr. BOLCKOW has won for himself was shown by his having been honoured to become the entertainer of Prince ALFRED when His Royal Highness paid his recent visit to the North. His gratitude to the people who have helped him to win his great fortune was on the occasion of the same royal visit abundantly manifested, and will remain in perpetual remembrance there.

STAFFORDSHIRE.—What Staffordshire has done has already been noticed in the *Mining Journal*. We need, therefore, only say that county deprived of Mr. W. O. FOSTER, the eminent ironmaster and colliery proprietor of that part, and has sent us Mr. ALEXANDER BROGDEN, of the firm of BROGDEN and SON, Tondur Iron Works, Bridgend, who also possess much ironstone property at Ulverstone. Mr. BROGDEN has been before in Parliament, and the immense majority of 2000 over his nearest competitor leads to the inference that he may fairly calculate upon sitting for this new borough for many years to come. It will be remembered that his conduct as an employer was most abundantly canvassed during the contest, and that he came out of the ordeal so as to strengthen his position amongst the employed. Since his return he has displayed a very kindly interest in the condition of the needy persons in the borough which he represents, by sending 200*l.* to be distributed amongst the poor widows. It is highly satisfactory that Mr. BROGDEN should be assisted by Mr. MCLEAN, whose present connection with Staffordshire, through his position as the managing proprietor of the first-class collieries on Cannock Chase, has already been dwelt upon in these columns. An interesting coincidence, too, it is that Mr. BROGDEN and Mr. MCLEAN should go in together for the first time as members for Staffordshire, inasmuch as they were associated when each became first connected with that part of the kingdom. Together they made the South Staffordshire Railway, and are the principal lessees of the line. Mr. W. S. RODEN goes up as the second member for Stoke-upon-Trent, where he is the managing partner in Earl GRANVILLE's great iron works and mines, at which 3000 persons are employed, and 150,000*l.* a year paid in wages. Like Mr. BROGDEN, Mr. RODEN also had to rebut, and did so with no less success, certain ungrounded charges in reference to his conduct as an employer. The North Staffordshire iron trade, as distinguished from the South, becomes in Mr. RODEN for the first time represented in Parliament. Sir SMITH CHILDE, one of the last-made baronets, who has ousted Mr. W. O. FOSTER in West Staffordshire, possessing considerable interest in mining property in North Staffordshire, may be depended upon on the right side when need requires, and so may Mr. POCHIN, who has been elected for Stafford borough, for he likewise is concerned in mines.

WORCESTER.—The city of Worcester, in returning Mr. A. C. SHERIFF, has contributed in the same direction, for he is a part proprietor of mineral property in North Wales, as well as being a director

of the Oldbury Wagon Company, and a partner in other similar manufacturing concerns in Staffordshire and Worcestershire.

CORNWALL.—Cornwall East, we are glad to say, has sent up Mr. E. W. BRYDGES WILLYAMS as the associate of Sir J. S. TRELAWNY. Mr. WILLYAMS, we described in the *Mining Journal* of September 19 (page 670), as a member of the great copper-smelting firm of SIMS, WILLYAMS, and Co., London. Although a young man, for he is not more than 34 years of age, Mr. WILLYAMS is eminently fitted for the position in which he now finds himself. He is not only an able man of business, but has been educated at Eton and Oxford; and his abilities and his social position have been so far recognised in the county which he now helps to represent, that he is not merely a magistrate there, but is also a Deputy-Lieutenant. Mr. WILLYAMS was successful in a contest with Mr. KENDAL, who was Sir JOHN TRELAWNY's colleague in the last Parliament. Mr. ARTHUR PENDARVES VIVIAN has gone in without opposition for Cornwall West, in conjunction with Mr. J. ST. AUBYN. He, too, like Mr. WILLYAMS, is young, for they are of the same age, and were schoolfellows at Eton; but whilst, as we have seen, Mr. WILLYAMS went to Oxford, Mr. VIVIAN went to Cambridge. Mr. VIVIAN also is a Justice of the Peace and a Deputy-Lieutenant, but his magisterial honours lie in Glamorganshire. By descent, however, Mr. VIVIAN is a Cornishman, his family having been intimately united to the county for centuries past. He is also closely connected with Cornwall in a business sense. His father and grandfather were each, in their day, as was shown in the *Mining Journal* of Aug. 29 (page 622), the greatest miners in Cornwall; and the grandfather was a Vice-Warden of the Stannaries. The new member's uncle, the late Lord VIVIAN, represented Cornwall for many years. With truth, therefore, could Mr. VIVIAN say in his address, "I am proud of my Cornish descent, and from my earliest days have been taught to entertain feelings of deep regard towards Cornwall." It may well be hoped that Mr. PENDARVES VIVIAN's election will tend to stimulate the trade of Cornwall. The business association of his firm with that part of the world is well known. The VIVIANs are amongst the largest purchasers of Cornish ores. Alluding probably to this, Mr. VIVIAN, in his address, said—"Commercially, my interests are intimately bound up with your own, and I venture to hope that I shall be able efficiently to represent their technical and commercial bearings." Of this we have ourselves no doubt, for there are few men of his age who have more knowledge and experience of the winning and working of minerals and metals than he possesses. Like his brothers, he was professionally educated at the Mining College of Freiberg, in Saxony, and he is now one of the men who take a prominent part in the management of the large copper works and rolling-mills of Margam, Taibach, and also of the extensive collieries of Morfa, where, as was intimated in the *Mining Journal* two months ago, some 180,000 tons of coal are raised every year. Mr. PENDARVES VIVIAN is, unquestionably, a very valuable accession to the mining and metal interests in the House of Commons. The Hon. J. C. VIVIAN, who has been returned with Mr. F. M. WILLIAMS for Truro, is the director of an iron company, and, therefore, will be a safe member, although his chief education has been obtained in the army, which he entered in 1836, and obtained the position of lieutenant and captain; but, as he is not more than 50 years of age, he will become increasingly valuable as a trade member with the lapse of time. Both he and Mr. WILLIAMS have before sat for Truro. They were returned together in 1865.

SOUTH WALES.—In Wales, we must place first and foremost Mr. HENRY HUSSEY VIVIAN, who has gone in for Glamorganshire with Mr. C. R. M. TALBOT, who is his ground landlord, and the Lord-Lieutenant of the county. Mr. HUSSEY VIVIAN is 47 years of age, was educated at Eton and Cambridge, is a Deputy-Lieutenant, and was first returned for Glamorganshire in 1857. Neither he nor Mr. TALBOT, who has represented the county for nearly 40 years, were opposed. Mr. VIVIAN, it is well known, is by the House of Commons deservedly deemed an authority upon all mining matters. To him, it will be remembered, the mining interest in this country are mainly indebted for the present Coal Commission. After what we have said about Mr. PENDARVES VIVIAN's business connections, we need hardly add anything under that head here. We rejoice in Mr. H. H. VIVIAN's return, and so, too, will every other person interested in any way in winning of the mineral wealth of these kingdoms. Mr. HUSSEY VIVIAN's is a case in which the workpeople will rejoice with the employers, for, as we showed in the *Mining Journal* of Aug. 8 (p. 570), we have no more zealous advocate of the colliers' interests than he is. Mr. TALBOT, also, is able to do good service on behalf of the coal trade, owing to his vast mineral property; and that, in the matter of practical sympathy with the collier, he is a fit condutor of Mr. VIVIAN was shown when he and the VIVIAN firm took upon themselves the responsibility of the support of the very large number of colliers' widows and orphans who were made such by the terrible explosion at Morfa. Merthyr Tydvil has sent up Mr. R. FOTHERGILL, who is the son of Mr. R. FOTHERGILL, of Bridge House, Westmoreland. Mr. FOTHERGILL is the managing partner of the Plymouth, Abernant, and Llwydd Coed Works, and also of the Taff Vale Works, at Treforest. Mr. FOTHERGILL being not more than 38 years of age, this description of his business engagements is quite sufficient indication of his worth as a trade member; but a further testimony was given in the fact that he was supported in his candidature by Mr. CRAWSHAY, of Cyfarthfa, Mr. G. T. CLARK, of the Dowlais Works, and other influential ironmasters. There is no wonder, then, that under these circumstances he should have been placed at the head of the poll. His colleague is Mr. HENRY RICHARD, the secretary of the London Peace Society, and a leading Non-conformist, who has been elected by an overwhelming majority, and the Right Hon. HENRY A. BRUCE, the faithful representative of the various material and local interests, has been rejected. We have not one word to say in disparagement of Mr. RICHARD. No doubt he is an able man, but we deeply regret that the newly enfranchised electors of the Merthyr and Aberdare districts would not see that their mining interests would be more promoted, and the wants and necessities of the colliers and ironworkers more zealously guarded, by a gentleman of Mr. BRUCE's great practical experience than by Mr. RICHARD, who does not pretend to even a superficial knowledge of the staple trades of the district. However, even in this decision of the electors of Merthyr, although in the abstract regarded as unfortunate, we see cause for congratulation. Mr. R. FOTHERGILL, a very large employer

of labour, and a gentleman of great ability and practical experience, has been elected, and takes his seat for the first time in the new Parliament. The interests of the staple trades may safely be entrusted to his hands; whilst we have no hesitation in saying that so able a statesman as the Right Hon. H. A. BRUCE will not long be permitted to remain out of the House, but that some constituency or other will gladly receive him. He has often addressed the House upon questions affecting the weal of the iron and coal trades, and has spoken with a weight and authority which few other statesmen enjoy, whilst his efforts in the cause of education, his anxious desire to give a practical knowledge to the miners and artisans generally, will always be held in grateful remembrance. We deeply regret, on behalf of the coal and iron trades, that we have lost, temporarily though it may be, the valued and able services of Mr. BRUCE, and sincerely trust that some other constituency will shortly open the doors of the House to him, and enable him to take that seat to which he is so eminently entitled on account of past services, and for the discharge of duties for which he is so well qualified. Carmarthen and Llanelly return Col. COWELL STEPNEY, who is one of the principal landowners in the neighbourhood of Llanelly, and has greatly benefitted that town. He may, therefore, be depended upon when any question has to be decided involving mining interests, but his advanced age (77), and his having spent most of his life as a soldier, for he entered the army nearly 60 years ago, and served under the Duke of WELLINGTON, may well be supposed to have prevented him from paying much attention to mining details. Swansea has again sent up Mr. L. L. DILLWYN, who is largely interested in the commercial prosperity of that very important manufacturing borough. He is a director of the Glamorganshire Banking Company and likewise of the Great Western Railway, has represented the borough 13 years, and, being 54 years of age, is in the prime of life. We may add, that the firm of which this gentleman is a partner is already establishing a new commercial connection with the county for the representation of which he has just been elected. The blende ores of Sardinia and the Medierranean having been found of considerable value, Messrs. DILLWYN, RICHARDS, and Co. tried extensive experiments with the blende ores of Cardiganshire, which up to a few months past were considered almost useless. Success having attended the experiments made, large works are now being erected at Landore for the smelting and manipulation of these ores, and there can be little doubt but that in a short time the works will rank amongst the most important in the district, giving employment to hundreds of hands, and at the same time materially enhancing the commercial interests of Cardigan.

In other parts other gentlemen have been returned who have an interest in, and an acquaintance with, the great staple trades, and whose aim and object will be to initiate and advance measures which shall tend to protect those trades from vexatious interference, and promote the prosperity of the many thousands of artisans connected therewith. Regarded, therefore, as a whole, we again say that we have reason to feel satisfied with the result of the recent contest. Whilst deploring the loss of one or two gentlemen who, in the late Parliament, laboured hard and zealously for the welfare of the coal and iron trades, and the prosperity of the working classes, we have to rejoice over the fact that a large number of able men still retain their seats, whilst there has been an accession to our ranks of gentlemen of great ability, undoubted practical knowledge, and sound commercial policy. We feel, therefore, that we may safely entrust the interests of our iron and coal trades, and our manufacturing generally, to the new Parliament, conscious that considerable material strength has been obtained from the elections; and that when questions affecting the welfare of those trades shall be brought on for consideration in the House, they will be ably and judiciously dealt with by those so thoroughly competent for the satisfactory discharge of the duties imposed upon them.

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MR. WARINGTON SMYTH'S LECTURES.

[FROM NOTES BY OUR OWN REPORTER.]

LECTURE VII.—I have to-day to complete what I have been saying with reference to the character of mineral veins and lodes as taken in themselves, and also as to the different classes grouped together. You will recollect that amongst the various points many have a purely scientific aspect, and have to be noted down as belonging to the study of Mineralogy, and again that many other details may have to be left to actual observation—such as the association of some minerals, as, for example, tin ore not being found along with calcareous spar, nor lead ore with felspar. It is very important that these associations should be vividly impressed upon your memories when you begin to be practically employed; and, indeed, it is to be wished that there were some works which might be especially recommended for perusal on this subject—such as the work of Prof. Breithaupt, on the Paragenesis of Minerals. Valuable tables of this kind will be found in the volume of Mr. W. J. H. Wood, which forms a portion of the Transactions of the Geological Society of Cornwall. There are two or three other questions about lodes to which I would refer to-day in conclusion of that part of my last lecture, which was devoted to what is a very important matter in practice—namely, the appearance of lodes on the surface of the ground; the observation, in other words, of their gossans. We have seen that on some of these gossans chemical action has been going on for a long period, and to considerable depths; indeed, no one can look upon the specimens in the museum of which some were on the table without seeing that chemical action betrays itself in a variety of ways, not only when they are discoloured red or brown, but by other indications. Agricola, the oldest writer on mining operations, describes at considerable length the conclusions he had formed on this point with respect to silver, "fusus or niger." But even when the deposits have not gone through this staining process, by chemical action various influences are always at work, changing to a considerable extent the character of the vein-stone. Thus, large octahedral crystals of fluor-spar are found to have been coated with quartz, and to have disappeared, while a second mineral has entered the open spaces. This is often met with in the Cornish mines, at a depth of 150 fathoms, where, no doubt, currents of water have flowed through the vein, accompanied by certain acids. The mine of the Virgin Mary, near Tavistock, which has not long been abandoned, furnishes beautiful specimens of this phenomenon, some of which will be found in the cases up-stairs, where, indeed, there are a vast number of examples of this kind from other mines also, which show in the clearest way that the anagenic changes which take place in the upper part of a lode are often succeeded in the depths by what are called catagenic changes.

There is another point attaching to mineral veins to be observed before speaking of their relation to other lodes, and that is the strong proofs that exist of mechanical violence done to the veins themselves. I mean in the brecciated and conglomerated character which most lodes in some parts more or less distinctly exhibit, the fragments often being evidently portions of a pre-existing vein. Thus, in the vast masses of mountain limestone which underlie the coal measures fragments of coal are found in fissures of the former when the line of fissure runs through both. One remarkable instance of this kind occurs in the Fallowfield Mine, in which sharp angular pieces of coal, cemented by white, or carbonate of iron, are found in the veins. In a few localities, and seldom in any quantity, are found in a vein in the mountain limestone. Facts like these are conclusive evidence that fissures have been repeatedly re-opened along the line of certain veins, and unless we are prepared fully to acknowledge the fact, or to fairly look it in the face, we may be greatly puzzled by the intersections met with. I will not pursue this subject to the end, but I wish for the present only to point out a few other proofs of mechanical action in the veins. One of these is furnished by the smooth, polished, and striated surfaces which occur in a great number of places, and extend over a considerable area, called "slickensides" by our miners, and by Germans "spiegel." These will often be found to be coincident with the walls of the lode running along the hanging-wall or the footwall, as the case may be, and sometimes along both. Occasionally there is a succession of them through the body of the lode itself. [The lecturer showed some specimens, one of which, from a lead mine, was strongly grooved or striated with lines parallel to one another.] These slickensides, although generally at the side of the lode, sometimes run parallel to the side, at some distance within it, and this might deceive the miner, and cause him to lose, by leaving untouched, a portion of the lode. It is, therefore, desirable occasionally to make a cut, to prove whether or not it is the true wall. Slickensides may also be traced in the faults of the coal measures and stratified rocks. Then, the shiny surfaces of slickensides may be found impressed on a variety of clays and shales, showing distinctly the sort of action which has produced them. Quartz, clay-slates, soft shales, carbonate of iron, galena, pyrites (both of copper and iron), and other metalliferous substances have all been found acted upon in the same way, and producing the same effects in these polished and shining surfaces, and that, too, in every part of the world. Another proof that these slickensides have been produced by the rocky masses slipping down is that in some places—as in Derbyshire, for instance—these surfaces are left in a state of tension so great as often to assist the miners very much. Thus, it has been noticed in the veins worked in the neighbourhood of Castleton that the miners cut across the face with the point of the pick, and the rock, being in a state of strong tension, splits off in larger or smaller pieces. It is this peculiarly which makes it difficult for geologists to get satisfactory specimens of slickensides, as the rock frequently splits off where they do not expect it to do so. Indeed, in Derbyshire the action is so violent that men have been injured by pieces flying in their faces when suddenly released in this way—although, notwithstanding, they have no objection to find the ground in this condition; but it is objected that slickensides have been found in the same lode with the strata running in two different directions. Geologists, however, know that many of the masses forming the crust of the earth have been repeatedly moved both up and down—so that, being once set in motion, there is no reason why the motion should not at different periods have had different directions, and so produced opposite sets of strata. Appearances of this kind may be seen every

day on a dusty road, left by a broad wheel wagon when, in descending a hill, the skid is put on. The track of the skidded wheel is marked by a smooth, polished surface, coated by a thin, metallic-looking film. Again, in proof that veins have been opened two, three, or more times, there will be found frequent indications, repeated in parallel ribs, that they have been opened on successive planes, and sometimes associated with another fact, that a portion of the pre-existing vein has been broken off when the part opened and re-cemented together. [Specimens illustrating this were shown by the lecturer from the Wicklow lead mines, and from a lode near Tavistock.]

I now come to the grouping of lodes in various districts, for it is not usual to find only a single lode in a district. There will always be other lodes parallel with it or crossing it at small angles. In all of the better class of mining districts the lodes will be found to coexist, and it is, therefore, important that you should gain a knowledge of what relation they bear to one another, and recognise the classes which run in the greatest quantity together, and are most likely to bear certain kinds of ore. First, we will consider the groupings of parallel lodes, in which if we find one lode we may look confidently for others running near it in the same direction. Thus, in the map of Cornwall (referred to) we find, in the districts of Tavistock, St. Austell, and Redruth, groups of veins, all running in the same direction, and again, in the Marazion and Helston districts, other groups running in a somewhat different line; but a tendency to parallelism is observable throughout the whole country. A very important fact connected with this lower sort of sight by the Cornish miners, who lay great stress upon it—and that is that a rich part of one lode will have in the opposite part of the parallel lode also a rich part, or, as they express it, "ore lies against ore." Places of poverty in like lie parallel to one another. In other districts where the strike of the rocks is much the same as the lode the Cornish miners adopt another mode of reasoning. They find cross-courses, which pass through, and at other times dislocate, the lodes, and whether these cross-courses will deteriorate the riches of the district or not is the point for consideration. No doubt the most productive districts are those in which cross-courses occur, but to say whether or not they make it so is a moot point. If you read the report of the mining agents you will find it frequently said that the lode is making ore, because as it was rich up to the cross-course, now the cross-course has been got through equal riches may be expected on the other side of it. Another agent, speaking of another mine, may say the lode is poor because it had been intersected by a cross-course, and they had not yet got far enough from its influence to regain their former prosperity. Thus, you will find cross-courses quoted as productive both of good and evil, and that is probably the true state of the case, and the balance can only be struck by a knowledge of the district. It will, however, frequently be found that if a vein be followed some distance from the point at which it was intersected strings and branches of ore are found in its neighbourhood, and that the main lode is acted upon; while one thing is certain, that if the lode be rich such strings will be rich for some distance, till they die off in the country, and if the lode be poor in itself the intersection will commonly improve the lode. This rule applies not only to the horizontal extension, but also to the depth, as the strings will come from the hanging-wall, and drop into the lode, or, in other cases, will seem to go off from the footwall—so that, while the former improve the lode, the latter appears to rob it of ore. There are instances in which these branches have gone out at the side, and come in again further on, forming a sort of loop, and circumstances of this kind usually produce riches. In New Granada, for instance, the gold and silver ores are more abundant when they throw off in small strings than in the larger lodes. I now pass from these cases of parallel lodes and strings to some of the ores which may be grouped with them. I have mentioned that the lodes which pass at an oblique angle or at right angles are called *caunter lodes* and cross-courses respectively. When we get amongst parallel lodes with opposite directions of dip we find that both are extremely likely to be productive and near the point of intersection, although numerous cases occur in which no favourable result is obtained. In these cases, then, the problem arises whether the one will be mastered by the other, or whether it will pass through it. A good deal depends upon the angle of intersection. If it be a right angle, or at any very oblique angle, the probability is that the intersecting vein will pass through the older one; but if the intersection be on planes that are only slightly divergent from parallel lines it frequently happens that they run together, the miners terming the one which absorbs the other the master lode. The lodes in Cornwall run chiefly in two directions—east and west, or north and south. I have explained caunter veins, but the real cross-courses are, for the most part, composed of dead mineral—such as barren quartz or clay. In some of the cross-courses, however, iron ores and lead ores are sometimes rich in silver, and there are cases in which a slight degree of obliquity has given rise to bunches of ore. When the east and west lodes intersect the north and south lodes it is not uncommon to meet with ores quite exceptional to both. For instance, near Redruth are copper mines which have produced, near a junction of this kind, cobalt, arsenic, and especially rich silver ores. And so at Callington, in the stead of a commonplace argilliferous galena, they found native and other silver ores in the lode. Circumstances like these cause the intersections of lodes to be looked to with great interest. I remember some years ago great excitement in the mining district in respect to a mine called Ludcott, from which a great many thousands pounds worth of silver was taken under circumstances of this kind. These masses of silver ore, however, are always found in extremely small lengths of ground when a cross lode or slide intersects a lead lode, and afterwards the lode resumes its ordinary productiveness.

I must, however, say a few words on the grouping of lodes in other countries. There is no district in the world where the lodes have been so fully and so studiously than that of Freiberg, in Saxony, where in a distance of ten miles long by six miles broad there are about 900 lodes, the characters of which have been made out with a considerable degree of certainty. These lodes have been classified for many years by their direction. Some strike away to the north and north-east, and others run almost at right angles to them. Another series run in a line, besides these, there is only a small number of caunter veins. It is here that the divisional arrangement I described the other day is most used. Thus, dividing the clock-dial (as in the diagram) from 12 to 3 represent the veins called Stehendegänge; from 9 to 12, Flache; from 6 to 9, Spat; and from 3 to 6, Morgen gänge. The Stehende gänge contain quartz, along with silver, and are rich in silver ore. The Flache veins contain carbonate of lime, and are poor. The Morgen gänge are composed of barytes in large quantities, along with ores of copper and silver. The Morgen gänge are not so rich for silver. A somewhat similar system of arrangement has been attempted for Cornwall and Devon by Mr. Carne, of Penzance. He placed the lodes of Cornwall under eight different heads, as follows:—

- 1.—The oldest tin veins running east and west, and dipping to the north.
- 2.—East and west copper lodes.
- 3.—East and west copper lodes.
- 4.—Caunter copper lodes.
- 5.—Cross-courses containing metallic substances (respecting which more facts have yet to be noted to make this division quite satisfactory), and cross-courses, non-metallic.
- 6.—Certain newer lodes of lead and copper.
- 7.—Cross-flores running north and south, and containing clay only.
- 8.—Slides, running east and west, having the effect of dividing anything they may fall in with. Thus, in the Tamar district they intercept the copper and lead lodes under the river, and dislocate them.

There is, however, a great deal of information wanted before these points can be all settled; but, in the meantime, this is a convenient sketch of the lodes, as representing the effects of the natural movements to which they have been subjected.

LECTURE VIII.—After recapitulating some of the facts mentioned in the last lecture, Mr. SMYTH said—Another class of remarks will close what I have to say upon veins or lodes. The disturbances to which they are liable by the intersection of other veins or cross-courses, or by heaves, have taxed the closest attention of all thoughtful persons who have had to do with mining, and it is natural that this should be so from the important consequences which result from such intersections and heaves. Thus, we may be following a lode in a certain direction, and all at once it will be entirely cut off. What, then, is to be done. If you continue your levels they will only run into the lode, and so to be or if you sink upon a lode and find it thus cut off, the question then is what has become of it, and in what direction are we to seek for its recovery. I have already explained, in the case of stratified rocks, the effects of heaves, by which a whole series of beds are dislocated, and the beds altered in position, to the extent sometimes of many fathoms. Dislocations of this kind are not less frequent in the case of mineral veins; but the difficulties which lie in the way of remedying them are even greater. This problem has engaged the attention of many able men, but the former have failed to solve upon the principal point on which elucidation is required. This may be partially accounted for, as most metallic mines occur in districts indistinctly stratified; and unless a course of porphyry or coloured slate exists, it is very difficult to recognise a particular portion of the rock in different parts. In well stratified rocks, of course, the case is different. Agricola, writing in 1557, described some dislocations, and saw the important fact that horizontal dislocations were caused by cross-courses or slides; but as to the question whether the rest of a lode was to be found by driving to the right or left, he has no rule of guidance, but says that that will be found sometimes on the one side, and sometimes on the other. Some German writers discovered that where the dislocating vein made an angle with that which was dislocated, the lost part was generally heaved towards the larger angle. Warner, of Freiberg, decided that the lower part of the dislocated lode is to be found on the hanging side of the dislocating one. Dr. Pryce, in his work on Cornwall, though he describes many instances of vertical disturbances, is almost entirely silent as to "the reason why," and it was not until the time of a German named Schmidt that both horizontal and vertical disturbances were ascribed to the action of faults.

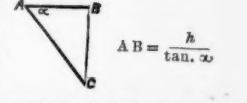
Later authors on the subject are Zimmerman and William Jory Henwood. They, however, adapt Schmidt's dictum, that wherever there had been a vertical slip there had been a horizontal one as well. And thus the amount of dip being ascertained, data are obtained by which to seek for the lost lode. When the two lodes dip contrariwise we must follow the side of the acute angle. When they dip within the right angle, the much depends on the depth of the dip, and we must follow the obtuse angle. When the dislocation has a less angular dip, then we must adopt special rules, which are only to be worked out according to each particular case. And the mode of working it out is a very simple one. When a lode is lost by the dislocation produced by a cross-course, lay down on a horizontal plane the course and direction of underlie of both the lode and cross-course, when there will be observable a smaller and a larger angle at the point of intersection, except in those rare cases where the one happens to be exactly at right angles to the other.

1. Then, if the two veins (lode and cross-course) dip contrariwise—that is, if there is more than a right angle between their lines of dip as taken in plan, drive along the slide on the side of the acute angle.
2. If they dip together, or within a right angle, when the dip of the lode is flatter than that of the cross-course, drive on the side of the acute angle.
3. If the cross-course is flatter than the lode, adopt the following general rule, depending on the deviation of the dip of the former from the line of intersection of the two veins.

General Rule.—At the point where the cross-course is touched determine and lay down horizontally the line of intersection of the two planes (lode and cross-course). Then from the same point project horizontally before you the line of

dip of the cross-course, or, in other words, draw a perpendicular to it in front of you. Remark on which side of the line of intersection this perpendicular falls and on that side cut in, and drive for the other portion of the lode.

The line of intersection may be found either approximately by geometrical construction, or more accurately by the trigonometrical formula, where A B is the line representing the horizontal projection of the dip, from a point A to another point, C, in the lode, at a vertical depth of h, below the level of A, the angle of inclination being α .



This is the only philosophical mode of treatment of which the subject is capable, and it is satisfactory, amidst so many elements of uncertainty, to have a rule which has proved, in most instances, to work out correctly.

The subject was illustrated by a considerable number of diagrams drawn by the lecturer, of varieties of heave or dislocation, and the problems they gave rise to.

GEOLOGICAL SOCIETY OF LONDON.

Nov. 25: Prof. T. H. Huxley, LL.D., F.R.S. (President), in the chair.

The following communications were read:—
1.—"On Floods in the Island of Bequa," by G. M. Browne; communicated by the Secretary of State for Foreign Affairs. On March 17, at 8 o'clock p.m., a steady strong wave was seen bearing down upon Admiralty Island, and no perceptible crest, and was 3 ft. in height; it encroached upon the beach varying from 70 to 350 feet. A second smaller wave followed, and the earthquake was felt.

Dr. DUNN wished for some explanation of these earthquake waves, especially with regard to the effects of supposed cataclysmic waves. He considered that they arose from sudden changes in the level of shoals or littoral tracts, and not from deep-sea disturbances.

Mr. BARRAGE suggested that, assuming an eruption of lava at the bottom of the ocean, there might be such an amount of steam generated, or even such a decomposition of water, as would originate waves of enormous volume.

Sir C. LYELL was inclined to the same opinion, and not to limit the causes of these waves to oscillations of the surface of the earth.

2.—"Description of Nya, Tatura, an Extinct Volcano in New Zealand," by Capt. F. W. Hutton, F.G.S.

3.—"On Dakosaurus," by J. Wood Mason, F.G.S.
4.—"On the Anatomy of the test of *Amphidius (Echinocardium) Virginianus*, Forbes; and on the genus *Bryonia*," by P. Martin Duncan, M.B., F.R.S., &c.

On Wednesday, the following communications will be read:—1. "Notes of a Geological reconnaissance in Arabia Petrea," by H. Baerman, F.G.S.—2. "On the occurrence of Sulphate of Strontium (Celestine) in the Tertiary rocks of Egypt," by H. Baerman, F.R.S.—3. "On the Basalt Dykes of the Matland of India," by G. T. Clark, F.G.S.—4. "On the existence during the Quaternary Period of a Glacier of the Second Order, occupying the 'cirque' of the valley of Paléres in the western part of the granitic 'massif' of the Lozère," by Dr. C. Martins.

THE INSTITUTION OF CIVIL ENGINEERS.—At the meeting of this society on Tuesday, Mr. Charles Hutton Gregory, President, in the chair, the first ballot for the session took place, when 31 candidates were declared to have been duly elected, including 10 Members—Mr. C. G. Blatchley, Saltash; Mr. G. B. B. District Engineer on the East Indian Railway; Mr. T. F. Brown, Cardiff; Mr. Alexander Cato, Chief Engineer of the Coughmoor Extension Railway, Chile; Mr. John Henry Hartwright, late of Chester; Mr. John William James, Stratford, Canada West; Mr. Alfred Roberts, Resident Engineer on the Great Indian Peninsula Railway; Mr. Robert Roberts, Engineer to the River Dee Company, Chester; Mr. R. Watson, Resident Engineer, Victorian Railways; and Mr. G. Woodbridge, Chief Resident Engineer of the Eastern Bengal Railway; and 21 Associates—Mr. S. B. Bidder, Jun., Assistant Manager of the Victoria Dock Company, Mr. R. Brundell, East Indian Railway, Allahabad; Mr. F. C. Bullmore, Resident Engineer on the Madras Railway; Mr. Thomas P. Campbell, Assistant Engineer on the Jubulpore line of the East Indian Railway; Mr. E. Scarlett Currey, late Resident Engineer at the Portland Pier; Mr. John Gomes Vieira Dantas, Rio de Janeiro; Mr. F. Gordon Davis, Gosses Lead Mining Co., Eggleston, Sardinia; Capt. Walter Mardon Ducat, R.E., Executive Engineer for Reclamations in Bombay; Mr. J. S. Farmer, Kilburn; Mr. H. A. Fisher, Surveyor to the Plumstead Board of Works; Mr. Thomas P. Gaskell, Minister; Mr. G. Harcourt, late Government Staff College, India; Mr. J. Thomas Holgate, late of the Rio Improvement Works, Rio de Janeiro; Mr. H. C. D. La Touche, Lahore and Peshawar Railway, India; Mr. E. A. Sacré, Westminster; Mr. J. Nidd Smith, Surveyor to the Greenwich District Board of Works; Mr. E. J. Statham, Great Southern Railway, New South Wales; Mr. C. S. Tancred, Canterbury, N. Z.; Mr. Henry A. Vivian, Engineer and Superintendent of the Coughmoor Railway, Chile; and Mr. W. Webster, St. Martin's place. The Council, acting under the provisions of Section IV of the bye-laws, have recently admitted the following candidates *Students* of the Institution:—Charles Toler Burke, George Ernest Faithfull, R. Harrison, K. W. Hedges, Francisco de Salls Torres Homem, Joseph Prime Maxwell, William Henry Read, Henry James Samson, Herbert de Symons Skipper, and Charles R. Western.

SOCIETY OF ENGINEERS.—On Monday evening papers will be read on the "Accumulator Cotton Press," by Mr. Ewing Matheson; and on the "Application of Steam to the Cultivation of the Soil," by Mr. Baldwin Latham, President of the society.

GEOLOGY MADE EASY.—It will be gratifying to geological students generally to learn that a new edition of Prof. JOHN MORRIS's well-known "Geological Chart" has just been issued through Mr. James Reynolds, of 174 Strand. It consists of a handsome and admirably printed sheet, some 3 ft. long and 2 ft. wide, and shows at one view the order of succession of the geological formations, with their mineral characters, principal fossils, average thickness, localities, uses in the arts, &c. The increasing intercourse between this country and the Continent often brings one in contact with foreign names of formations for which it is not easy at once to find the English equivalent expressions, and from the acknowledged advantage of retaining as far as possible local names, instead of hastily referring them to some supposed corresponding formation in England, it is unlikely that the use of these names will be discontinued. The element, for example, that in a given German mine there was a good bed of impact, or tertiärdolite, after passing through the muschelkalk, the Kupferschiefer being then reached, and promising to give a large percentage of metal, would be quite admissible as an English report; yet, unless to the more advanced scientific geologist, it would convey but little knowledge as to the geological position of formations from which the metal was to be derived. From Prof. Morris's Chart the necessary information can be at once obtained. We find that the buntersandstein occupies much the same position as the Red Sandstone at the bottom of the secondary formation, and therefore corresponds in position to the dolomite conglomerates met with at Bristol, and to sandstone found at Storton Hill, Cheshire; whilst the muschelkalk (although itself absent in England) may be referred to the so-called waterstone, used for building purposes in Cheshire. In the same way the Kupferschiefer is found to correspond in position to the marl slate of the Permian formation, immediately below the magnesian limestone. Other particulars of the same character can, of course, be obtained with equal facility, whilst with regard to the English geological information it is of little doubt that the present edition has been so revised by Prof. Morris as to put it fully in accord with present geological knowledge, and is altogether worthy of being considered the most recent and complete geological synopsis extant.

NOTES UPON LIFE ASSURANCE.—Vast as are the benefits connected with life assurance the principles upon which assurance business is conducted is so imperfectly understood by the general public that, notwithstanding the large number of offices in existence, the number of lives assured in proportion to the entire population of the kingdom is extremely small. To facilitate the acquisition of the necessary information, an admirably conceived and highly interesting little pamphlet, entitled "Notes on Life Assurance," has just been issued (through Messrs. J. B. Nichols and Son, of Parliament-street) by the Rev. JOHN HODGSON, M.A., secretary to, and one of the original founders of, the Clergy Mutual Assurance Society. The various points to be considered in selecting an office wherein to assure is fully discussed—the mode of making those calculations which guide assurance companies in their contracts with their customers being carefully explained, and instances being given of cases in which the necessity of those calculations would arise. The Clergy Mutual Assurance Society being what is technically known as a class society, Mr. Hodgson's remarks are specially addressed to the clergy, whose lives taken alone can it appear be assured at a lower rate of premium than when all classes of lives are accepted; but his observations will enable those desirous of doing so to become as competent to determine the relative advantages of the different offices open to them as need be desired. The circumstance of the writer of the pamphlet being the author of "Hodgson's Clergy Mortality Table," which is the result of investigations made by him as to the course which mortality took amongst upwards of 5000 clergymen between the years 1750 and 1850 is a sufficient guarantee for his experience. The pamphlet should be carefully studied by all concerned.

CHEAP AND USEFUL LITERATURE.—At the approaching season for making presents, the handsome little volumes of profusely illustrated children's and servants' books, annually issued by Messrs. Seeley, Jackson, and Haldar, of Fleet-street, and PARTNERS and Co., of Paternoster-row, are especially worthy of commendation. The volumes for 1868, just published, are bound in illuminated boards, whilst their variety permits of such a selection being made as shall exactly suit the persons for whom they are intended. The "Infants Magazine" has an abundance of pretty pictures, accompanied by tales calculated to suit the taste of children just commencing to read; whilst the "Children's Friend" would meet the wants of those a few years older; and next in the scale may be placed the "Familiar Visitor," which is specially adapted for all ages, from childhood upwards. The "Band of Hope Review" and the "British Workman" are so well known that it is unnecessary to say more concerning them than that the year's numbers, bound together in a brilliantly coloured wrapper, make a very handsome gift book. With regard to the latter work, however, it may be mentioned as an instance of the extent to which it is appreciated even in far distant lands, that Mr. Dilke, during his recent travels in the southern hemisphere, found enquiries for "Sunday at Home" and the "British Workman" were amongst the first which he had from the Pitcairn Islands. The "Servants' Magazine," another of this series of books, is a really handsome and instructive volume, which any master or mistress may be proud to give to those whom they employ. It is neatly bound in cloth and gilt lettered, and contains an enormous amount of information, the study of which cannot fail to prove of lasting value to the reader.

THE MANUFACTURE OF WATCHES AND CLOCKS.—A most interesting and instructive little work, describing briefly, but with great clearness, the rise and progress of watch and clock making, has just been published by Mr. J. W. Benson, of 25, Old Bond-street, 99, Westbourne-grove, and the City Steam Factory, 58 and 60, Ludgate-hill. The book, which is profusely illustrated, gives a full description of the various kinds of watches and clocks, with their prices, and no one should make a purchase without visiting the above establishments or consulting this truly valuable work. By its aid persons residing in any part of the United Kingdom, India, or the Colonies, are enabled to select for themselves the watch best adapted for their use, and have it sent to them with perfect safety. Mr. Benson, who holds the appointment to the Prince of Wales, sends this pamphlet to any address on receipt of two postage stamps, and we cannot too strongly recommend it to the notice of the intending purchaser.

THE SOUTH LANCASHIRE AND CHESHIRE STEAM COALS.

RESULT OF THE EXPERIMENTS.

An admirable abstract of the results obtained in the recent official trials of the coals of the Wigan and neighbouring districts has been given by Mr. L. E. FLETCHER, chief engineer of the Manchester Association for the Prevention of Steam-Boiler Explosions, and for the Attainment of Economy in the Use of Steam, in his Monthly Report for September. It will be remembered that the special object of this series of trials was to show the suitability of the South Lancashire and Cheshire coals for use in Her Majesty's Navy. The trials were carried out at the expense of the South Lancashire and Cheshire Coal Association, under the superintendence of the late Dr. Richardson, of Manchester, and Mr. Fletcher, and it is with the permission of that association that these particulars are presented to the members:—

Mr. Fletcher says:—I propose to describe in the first instance the mode of conducting the investigation, with the testing apparatus employed; in the second, the preliminary trials with the modifications in the furnaces and treatment of fires arrived at; and in the third, the permanent trials with their results.

I.—DESCRIPTION OF THE MODE OF CONDUCTING THE TRIALS, AND OF THE TESTING APPARATUS EMPLOYED.

The principle on which these trials were conducted was simply that of ascertaining by practical experiment in a steam-boiler how much water 1 lb. of coal would evaporate, also at what speed that could be done, and whether with or without the formation of smoke. To this end all the water evaporated was accurately measured; the coal carefully weighed; and the time expended in doing a given amount of work noted; added to which the amount of smoke emitted was observed and registered.

It may be well to describe more in detail the mode adopted for measuring the water and weighing the coal, as well as the boiler employed, and the method of estimating the amount of smoke.

MEASUREMENT OF THE WATER.—Water meters are not always to be relied on, and, therefore, to avoid every chance of mistake, or even suspicion of inaccuracy, a tank was employed of sufficient size to carry through an entire experiment with a single charge. This tank, which had a superficial area of 50 square feet, and thus a capacity of 2601 lbs. per each inch in depth, was fitted with a float, which, reposing on the surface of the water, rose and fell with it, and operating upon a pointer, travelling over a scale graduated in feet and inches, indicated the precise amount consumed, as well as the rate of progress throughout the trial.

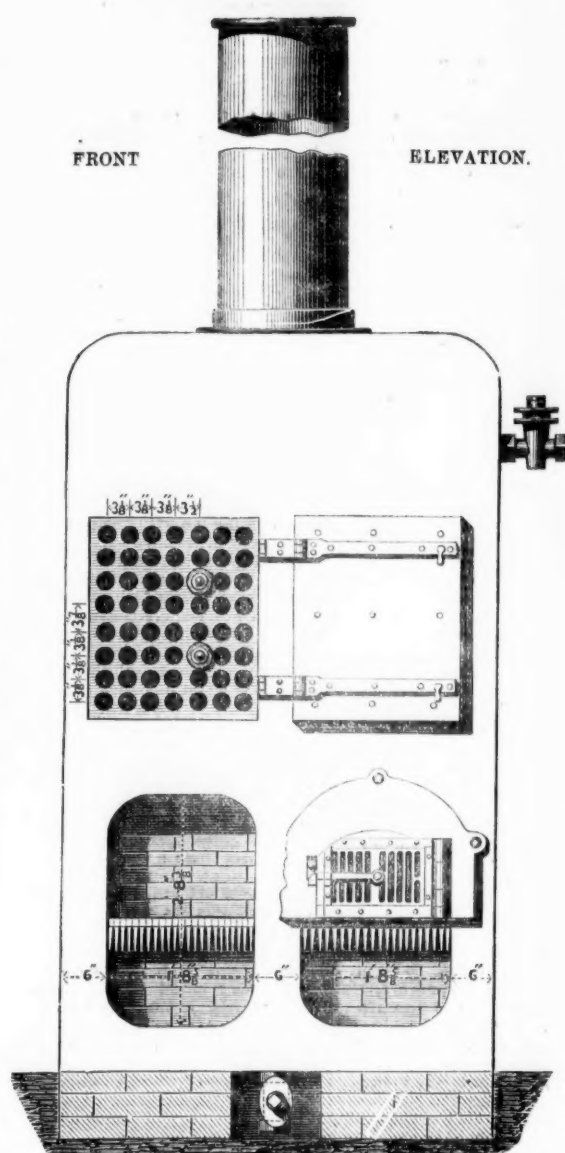
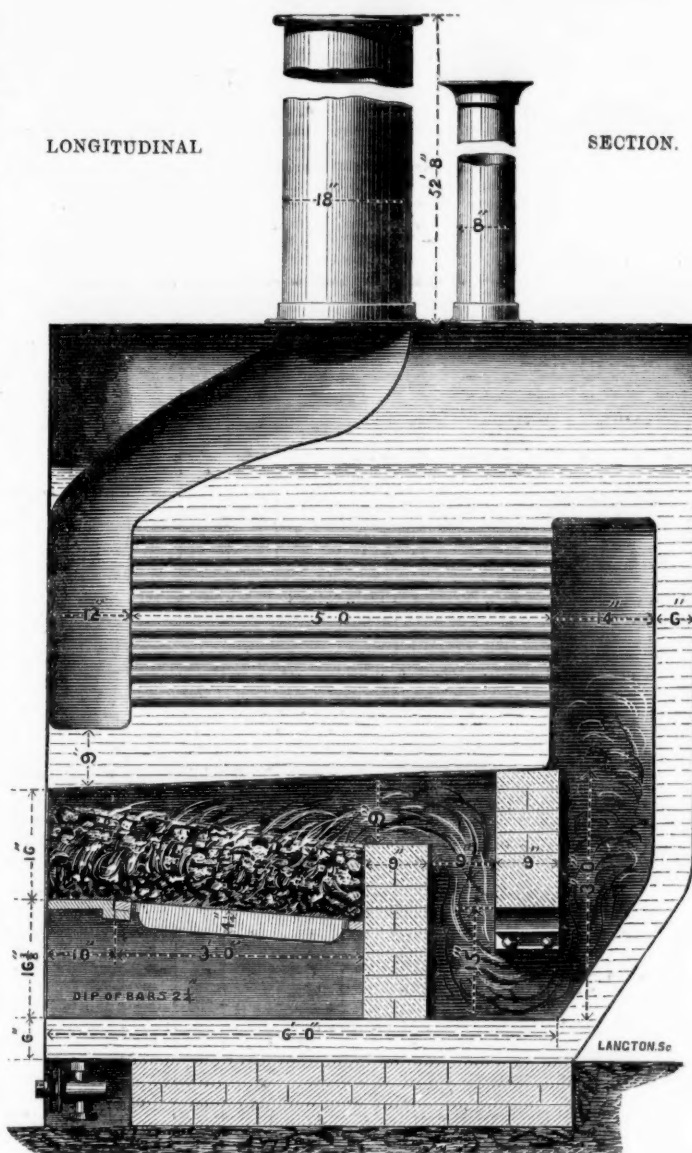
It is usual in such trials to evaporate the water at atmospheric pressure, so as to afford a common standard for the comparison of different experiments, while it has a further advantage of dispensing with the necessity of a pump, and of very much reducing the chances of waste from leakage. The plan had been adopted by the Admiralty in previous trials, and, therefore, was followed on the present occasion. The tank was placed at a short distance from the boiler, and at a sufficient height for the water to flow into it by its own weight, the two being connected by a pipe 2 in. in diameter, which was fitted with a stop-tap, so that the supply could readily be controlled by hand, while the whole was placed so as to be quite open to view, so that no loss from leakage could go on unobserved.

The feed-water was supplied to the boiler at its natural temperature, whatever that might happen to be, but as this varies at different times, and clearly affects the result, it is important that an allowance should be made for these variations so as to admit of the correct comparison of different experiments. It is, therefore, customary to qualify the amount of water evaporated by the temperature of the feed, and to reduce it to a standard of so many pounds of water evaporated from a temperature of 212° or 100°, as may be decided on. As the standard of 100° had been adopted by the Admiralty in previous experiments it was adhered to on the present occasion, and the necessary qualification made.

MODE OF WEIGHING THE COAL.—The coal was weighed in charges of 200 lbs., and shot down in front of the boiler, so as to be kept entirely distinct from the general stock.

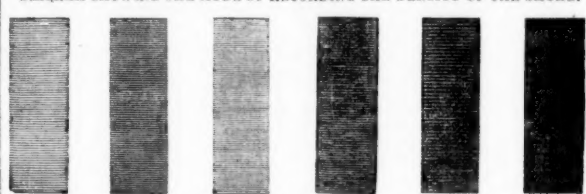
DESCRIPTION OF THE TEST BOILER.—As these trials had special reference to the suitability of the coals of this district for steam purposes on board Her Majesty's Navy, a boiler of the marine tubular type was adopted; and, further, as a special one is employed at Her Majesty's Dockyard, Keyham, for testing the value of coals, it was proposed by Dr. Richardson that to avoid all question a precisely similar one should be used for the Wigan trials, and with this view a *fac simile* of the Keyham test boiler was made from drawings kindly furnished by Mr. T. W. Miller, chief engineer at Her Majesty's Dockyard, Keyham. This boiler was of very cramped proportions, and by no means calculated to develop the highest results from the coals, but it was adhered to for the reasons just given. It measured 7 ft. 8 in. in length, 8 ft. 10 in. in height, and 5 ft. in width, and contained 124 flue tubes, 5 ft. long and 2½ in. diameter inside, with two furnaces each 1 ft. 8½ in. in width. The heating surface afforded by the tubes was 365 square feet, by the flame chamber and furnaces, including the ash-pit, 128 square feet, making a total of 493 square feet of heating surface. The equipment of the furnaces was of the usual class, consisting of an ordinary fire-door, dead-plate, set of fire-bars, and single vertical brick fire-bridge, the fire-door being fitted with a sliding grid for the admission of air when required, and a perforated box at the back for the dispersion of the current. To give a better idea of the proportions of the boiler with the furnace mounting, two cuts are appended, the first of which gives a longitudinal section through one of the furnaces, the other a front external elevation, added to which there is subsequently given an enlargement of the fire-door.

METHOD OF ESTIMATING THE AMOUNT OF SMOKE.—To accomplish this, an observer watched the chimney throughout the whole experiments, and noted every minute in which smoke occurred, the



density being defined by gradations of 1, 2, 3, 4, 5, 6, as shown in the following diagram:—

DIAGRAM SHOWING THE MODE OF RECORDING THE DENSITY OF THE SMOKE.



In the tables accompanying this report, however, the six gradations just given are reduced to three for the sake of simplicity, under the designations of "very light," "brown," and "black," as shown in the following diagram:—



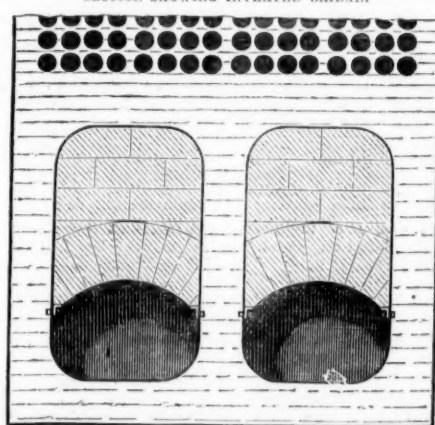
II.—PRELIMINARY TRIALS WITH THE MODIFICATIONS MADE IN THE FURNACES AND TREATMENT OF THE FIRES.

At the commencement of the trials only 801 lbs. of water were evaporated by 1 lb. of coal, and 35.88 cubic feet of water by the boiler per hour, with a consumption of 20 lbs. of coal per hour per square foot of fire-grate; subsequently, however, the results were considerably improved, and 11.11 lbs. of water were evaporated by one of coal, with a speed of 46.19 cubic feet of water per hour, and 25 lbs. of coal per hour per square foot of fire-grate. This improvement was obtained simply by slight modifications in the proportions of the furnaces and treatment of the fires.

It would be interesting to trace all these modifications, and to give the results of each. This, however, would be a work of too great length for the present occasion. Suffice it, therefore, to say that 115 preliminary experiments were made, during which it was found of advantage to reduce the length of the fire-grate from 4 ft. to 3 ft., to adopt a blind dead-plate in preference to a perforated one, and to slightly lower the level of the fire-grate, so as to increase the flame

chamber above the bars, while there is no doubt that a further advantage would have been gained by lowering the bars still more had not the ash-pit become thereby too cramped for the due admission of air. No bar was found to give a better result than a wrought-iron one, 1 in. thick, with ½-in. space as windage, while the addition of an inverted or hanging bridge behind the ordinary vertical one was found of advantage in preventing smoke, its action being to assist in mixing the gases and maintaining the temperature of the furnaces. The construction of this bridge will be readily understood on reference to the accompanying cut.

SECTION SHOWING INVERTED BRIDGE.



The following figures will show the result of its working:—

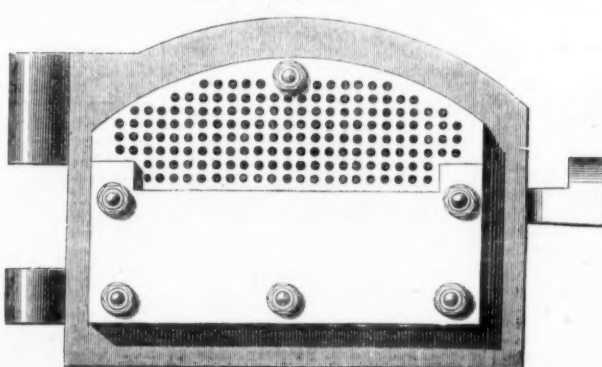
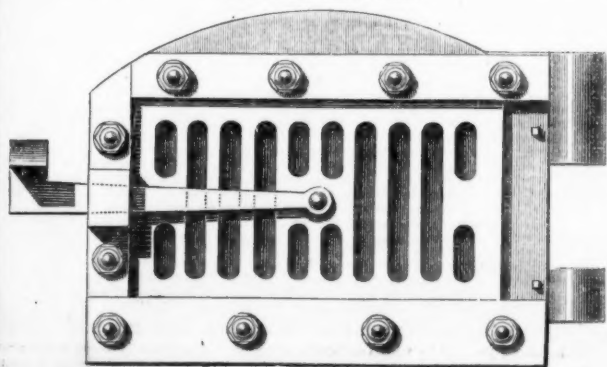
COMPARATIVE TABLE OF RESULTS WITH AND WITHOUT INVERTED BRIDGE

NAME OF COAL AND CHARACTER OF TRIAL.	Lbs. of water at 100° evaporated per lb. of coal.	Cubic feet of water at 100° evaporated per hour.	Smoke per hour.	
			Minutes of very light.	Minutes of black.
High Yard coal, with inverted bridge	11.24	47.38	0.5	0
Ditto, without ditto	11.05	51.31	2.5	0

The number of perforations for the admission of air through the fire-doors was also modified. In the first instance there were 730, giving an area of 3.2 square inch per square foot of fire-grate. These were afterwards reduced by bolting a blank plate over the lower part of the doors, so as to make the number of perforations 342, equal to an area of 1.6 square inches per square foot of fire-grate. It is thought that the benefit from this change arose more particularly from the alteration in the point of admission, and it was afterwards found necessary with the thickest fires to leave the doors 1 or 1½ in. ajar for a minute or so after firing, to prevent the formation of smoke.

The proportions of the furnaces finally adopted, with the length and level of grate and arrangement of fire-bridges, are those shown in the cuts of the boiler already referred to, while the following enlarged view of the fire-door will show its general construction and the final number of perforations.

In addition to the modifications in the proportions of the furnaces, two modes of firing were adopted, one termed "spreading," the other "ooking." In



spreading firing the coal is scattered evenly over the whole surface of the fire-grate, commencing generally at the fire-bridge and working forward to the fire-door. In coking firing, the charge of coal is thrown on to the dead-plate in front of the bars, and allowed to lodge there for a time, in order that the mass may become coked through, and when that is done, the crest is pushed back towards the bridge, and another charge thrown on to the front of the fire in its place. In this way the gases are gradually evolved from the coal at the front, while a bright fire is maintained at the back over which the gases pass. On trying the two plans, coking firing was found to give a more economical result than spreading, and at the same time to produce less smoke, while, in addition, a higher result was obtained by thickening the fire from 6 to 9 inches, and again from 9 to 12 inches. Coking firing was, therefore, adopted as the standard method, and with fires 12 in. thick, while the furnaces were charged alternately, and the perforations allowed to remain open for a few minutes after charging for the prevention of smoke.

III.—PERMANENT TRIALS AND THEIR RESULTS.

The preliminaries just described having been determined, 15 coals selected by Her Majesty's Inspectors of Mines, Mr. Joseph Dickinson, and Mr. Peter Higson, were then submitted to trial *separatim*. The following is a list of their names:—

Hindley Yard.	Haigh or Arley Yard.
Worsley Top Four Feet.	Furnace Mine.
Upper Crumbouke.	Bickerstaffe Four Feet or Blangate Mine.
Lower Crumbouke.	Rushy Park and Little Delf Mines, worked simultaneously and mixed.
Upper Three Yards.	Inco Three Feet, Four Feet, and Seven Feet Mines, worked simultaneously and mixed.
Six Feet Rams.	Arley Mine.
Great Seven Feet.	
Blackrod Yard.	
Pemberton Little Delf or Two Feet Mine, and Pemberton Four Feet Mine, where the two are so near together as to form one seam.	

Although it had already been found that thick firing gave better results than thin, yet as the whole of the preliminary trials had necessarily been made with one coal for the purpose of comparison, it was thought desirable to test all the coals on the list with various thicknesses of fires, rather than to assume they all required precisely the same treatment, and therefore they were tried with fires 9 in. thick, and then with 12 in. thick, the latter being thought at first the greatest thickness permissible, but experience showing that 14-in. fires could be managed, additional samples of the coals where necessary were procured, and further trials made with 14-in. fires. Added to this, a longer trial was made, in which 1500 lbs. of coal was burnt instead of 1000 lbs., as in others, in order to see how far the coal would maintain its efficiency in a long run. Also the effect was tried of closing the perforations in the fire-doors as an indication whether too much air had been admitted or not. In all the trials just named the coking system of firing was adopted, but an additional one with spreading firing 12 in. thick was made as a comparison, and as it was found in all cases that coking firing proved to be the most economical, further trials on the spreading system were thought unnecessary.

The result of these trials showed that the coals possessed a very high evaporative power, combined with great speed; one coal evaporating 11-10 lbs. of water at 100° per lb. of coal; a second, 11-13 lbs.; a third, 10-19 lbs.; a fourth, 10-91 lbs., &c.; while in the case of the first, 46-17 cubic feet of water were evaporated by the boiler per hour; in the second, 48-60 cubic feet; in the third, 51-34 cubic feet; in the fourth, 45-37 cubic feet; while only a little faint smoke was occasionally visible. These results were very superior to those reported to the Admiralty in 1849 by Sir H. De la Beche and Dr. L. Playfair, who returned the economic evaporative power of the best of the Lancashire coals as only equal to 8 lbs. of water at 100° evaporated by 1 lb. of coal. The results obtained from the South Lancashire and Cheshire coals were found to compare very favourably with those obtained from the North Country and Welsh coals at Her Majesty's Dockyard, Keyham, but it was thought it would be of further satisfaction to try the Welsh and Newcastle coals in the Wigan boiler for comparison, and this was therefore done. The results will be more readily seen if arranged in the form of a table, as follows:—

COMPARATIVE TABLE OF THE RESULT OF THE TRIALS OF THE NORTH COUNTRY, THE WELSH, AND THE SOUTH LANCASHIRE AND CHESHIRE COALS.

NAME OF COAL AND PLACE OF TRIAL.	Lbs. of water at 100° evaporated per lb. of coal.	Cubic feet of water at 100° evaporated per hour.	Smoke per hour.		
			Minutes of very light.	Minutes of brown.	Minutes of black.
NORTH COUNTRY COAL.					
Davidson's mixed with Hasting's Hartley, in equal quantities—tried at Keyham	10-71	43-00	3-4	0	0
ditto tried at Wigan	10-71	51-33	1-3	0	0
WELSH COAL.					
Powell's Duffryn mixed with Nixon's Navigation and Davis's Abercromby, in equal quantities—tried at Keyham	10-14	38-60	3-1	0	0
ditto tried at Wigan	10-15	48-60	1-7	0	0
SOUTH LANCASHIRE AND CHESHIRE COALS.					
Hindley Yard Coal tried at Wigan	11-10	46-17	0-2	0	0
Lower Crumhouke Coal—ditto	11-15	48-60	1-8	0	0
Great Seven Feet Coal—ditto	10-49	51-34	5-9	0	0
Blackrod Yard Coal—ditto	10-91	45-37	2-4	0	0
Haigh Yard Coal ditto	11-24	47-38	0-5	0	0

Detailed results of the permanent trials of the whole series of coals, when treated on the coking system, with the fires 14 in. thick, and the perforations in the doors intermittently open—which were the conditions that afford the highest results—will be found in the tables appended (see Sheets 1, 1a, 1b); but as the detailed tables of the remaining trials—made under various conditions as to the thickness and treatment of fires, admixture of air with the gases, and length of experiment—occupy as many as 38 sheets, it was found impracticable to include them in *extenso* in this report, but the condensed results are subsequently given.

When all the coals on the list had been tested, and the results given in the tables just referred to arrived at, the Admiralty sent down two of their officers—Mr. Robert Nicoll, R.N., assistant to the chief engineer at Her Majesty's Dockyard, Keyham, and Mr. William Lynn, assistant inspector of machinery at Her Majesty's Dockyard, Portsmouth—to witness a repetition of the trials, and report thereon. A table giving the results obtained by the Admiralty officers will be found on sheet No. 2. All the trials hitherto referred to were made with the natural chimney draught, but it was thought well for the Admiralty officers to witness a second series with the draught quickened by mechanical means, and therefore a steam-jet, fed by an adjoining boiler at a pressure of 30 lbs. per square inch, was applied to the chimney. A table giving the results of this second series of trials by the Admiralty officers will be found on sheet No. 2a.

To facilitate a comparison between the results of the original series of trials, and of the verifications by the Admiralty officers, sheet No. 3 has been prepared, which gives in parallel columns the net results of the different trials of each of the coals on the list, while the following table gives the mean of the whole:—

TABLE OF THE MEAN RESULT OF ALL THE SOUTH LANCASHIRE AND CHESHIRE COALS EXPERIMENTED ON.

CHARACTER OF TRIAL.	Lbs. of water at 100° evaporated per lb. of coal.	Cubic feet of water at 100° evaporated per hour.	Smoke per hour.		
			Minutes of very light.	Minutes of brown.	Minutes of black.
Mean results of all the coals tried by Dr. Richardson and Mr. L. E. Fletcher	10-35	47-22	2-7	2-4	0
ditto verified by Admiralty officers	10-68	48-30	2-7	1-1	0
ditto with steam jet tried by Admiralty officers	10-18	69-13	41	0-0	0

* Mr. Fletcher has so carefully given his conclusions to which the details contained in the sheets of tables here referred to lead, that it has been deemed unnecessary to append them.

This table shows that the Admiralty officers more than verified the results previously given, and in reporting to the Admiralty thereon they stated that such was the case.

Further to test the value of the coal, it was thought well to have a trial at sea, and therefore a run was made with the "Lindsay," a screw collier of about 800 tons burden, fitted with two boilers, each containing three furnaces, and driving a pair of engines having a diameter of 28 in. in the cylinder, making 70½ revolutions per minute, and indicating about 460-horse power. The trial was most satisfactory; coking firing, as already explained, was adopted, and carried out by the ordinary ship's stokers, and Messrs. Nicoll and Lynn report that "steam was kept blowing-off at the waste steam pipe all the time of the trial, while no smoke was visible during the whole of the four hours' run." The Commissioners close their report with these words—"In conclusion, these experiments, including that of the 'Lindsay,' show that when the products of the coal are consumed, which we consider can be easily done by careful firing, the coals of this district have a high evaporative value, combined with great speed, and are in every respect fit for Her Majesty's service."

To assist in estimating the advantages of different thicknesses of firing, sheet No. 4 has been prepared, which gives the results of firing each coal with a thickness of 14, 12, and 9 inches. The following table gives the mean results of the whole number of coals at each thickness of fire:—

COMPARATIVE TABLE OF THE RESULT OF DIFFERENT THICKNESSES OF FIRES.

CHARACTER OF TRIAL.	Lbs. of water at 100° evaporated per lb. of coal.	Cubic feet of water at 100° evaporated per hour.	Lbs. of coal burnt per hour per square foot of fire-grate.	Smoke per hour.		
				Minutes of very light.	Minutes of brown.	Minutes of black.
Mean results of all the coals, with coking firing, firing. Fires 14 in. thick	10-35	47-22	27	2-4	0	0
ditto	10-06	45-67	27	2-8	0	0
ditto	9-65	44-00	27	1-0	0	0

From this it will be seen that a fire 14 in. thick gives a more economical result than one 12 or 9 in. thick, while no diminution of speed is experienced.

To show that coking firing, coupled with the admission of a little air above the bars immediately after charging, which is the smokeless system, is not attended with any loss in economy, sheet No. 5 has been prepared, which gives the result of three different systems of treatment applied to each coal:—1st, The coking system, coupled with the admission of sufficient air above the bars to prevent smoke. —2d, The coking system, with perforations in the fire-door closed. —And 3d, The spreading system, with the perforations in the fire-door open after charging. The following is the mean result of each of the three systems:—

COMPARATIVE TABLE OF THE RESULT OF FIRING ON THE COKING AND ON THE SPREADING PRINCIPLE, AND ALSO OF ADMITTING AIR AT THE FIRE-DOOR OR NOT.

CHARACTER OF TRIAL.	Lbs. of water at 100° evaporated per lb. of coal.	Cubic feet of water at 100° evaporated per hour.	Lbs. of coal burnt per hour per square foot of fire-grate.	Smoke per hour.		
				Minutes of very light.	Minutes of brown.	Minutes of black.
Coke firing with fires 12 in. thick. Perforations in fire-door open after charging	10-13	46-36	27	3-2	0-0	0-0
Coking ditto, with perforations constantly closed	9-75	47-03	29	12-6	1-4	0-6
Spreading ditto, with perforations in fire-door open after charging	9-51	51-37	32	20-8	5-3	4-2

A consultation of this table will show that there is no loss in economy from adopting the smokeless system of firing, but, on the contrary, a slight gain, though there is a loss of speed, neither as much coal being burnt per square foot of fire-grate nor as much water evaporated per hour from the boiler. Thus the table shows at once the advantage and difficulty of smoke prevention. It is feared that difficulty will be experienced wherever boilers are overtasked, while it will be seen that the table affords an explanation of the objection entertained by firemen to admitting air above the fire bars when they want to raise steam quickly.

On making a longer trial—that is to say, consuming 1500 lbs. of coal instead of 1000 lbs., and running for an average length of time of 5h. 9m., instead of 3h. 27m., the result was slightly inferior in economy, though practically equal as regards the amount of water evaporated by the boiler per hour and the absence of smoke. The precise figures are given in the following table:—

CHARACTER OF TRIAL.	Av. length of trial.	Amount of coal consumed.	Lbs. of water at 100° evaporated per lb. of coal.	Cubic feet of water at 100° evaporated per hour.	Lbs. of coal burnt per hour per square foot of fire-grate.	Smoke per hour.		
						Minutes of very light.	Minutes of brown.	Minutes of black.
Short trial	3h. 27m.	1000	10-29	46-81	27	2-4	0	0
Long trial	5h. 9m.	1500	9-76	45-71	28	2-0	0	0

It may be added that in this series the fires were treated on the coking system, as before, and that in some cases they were 14 inches thick, in others 12 inches, and in one 9 inches—care, however, being taken in quoting the result of each coal that the thickness of fire should be the same in the short trials as in the long, so that the comparison is a correct one.

Such is a brief account of the series of trials of the South Lancashire and Cheshire coals. It will be seen, however, that these coals have a high evaporative power, combined with great speed, some of them, as returned by the Admiralty officers—who were sent down to investigate and report—being able to evaporate 11-13 lbs. of water at a temperature of 100° per lb. of fuel at a speed of 26 lbs. of coal consumed, and 4-7 cubic feet of water evaporated per square foot of fire-grate per hour, while the mean of the 15 coals tried gives an evaporation of 10-68 lbs. of water, at 100° per lb. of fuel, at a speed of 27 lbs. of coal burnt and 4-6 cubic feet of water evaporated per square foot of fire-grate per hour.

Since these trials, as previously stated, had special reference to the suitability of the South Lancashire and Cheshire coals for use in Her Majesty's Navy, round coal was used almost entirely, and not slack. These trials, therefore, do not exhaust the whole subject of the economy of fuel with regard to mill purposes, yet it is thought there are several points in them which are of general interest, and that the circulation of information with regard to them will prove of assistance to the ordinary steam user. It is of interest to note that the free burning and gaseous coals of this district were burnt in these trials with the entire absence of any smoke beyond the faintest trace, and that this was accomplished both at sea and on land, and that, not by means of any special apparatus, but simply by careful firing, accompanied by the admission of a little air through the fire-door, for a short time after charging. It should also be noted that economy was the result of this smokeless system of firing, and of the admission of air through the fire-door, also that thick fires were found to be more economical than thin, and short fire-grates than long ones, and though due regard must be had to the amount of steam required, yet it is thought the fire-grates in ordinary use in mill boilers are, as a rule, too long.

LOCOMOTIVES.—At the close of 1867 the stock of locomotives owned by the 12 leading British railway companies was as follows:—Caledonian, 515; Great Eastern, 380; Great Northern, 468; Great Western, 842; Lancashire and Yorkshire, 465; London and North-Western, 1443; London and South-Western,

259; London, Brighton and South Coast, 252; Manchester, Sheffield, and Lincolnshire, 254; Midland, 623; North-Eastern, 851; and South-Eastern, 243. The 12 companies thus owned between them 6595 locomotives, the first cost of which, at an average of 2500l. per engine, was 16,487,500l.

MINING IN AUSTRALASIA—MONTHLY SUMMARY.

South Australian advices state that gold mining was on the increase. At Jupiter Creek a nugget weighing over a pound had been found 4 ft. from the surface, and several hundred men were at work there. At Yatta Creek and Barossa West further discoveries had been made, and 960 licences granted. Still it was an impression in many quarters that the gold workings will not prove remunerative to a greater extent than other and ordinary labour, and that the general prospects of the colony will be little altered. All other mining was likewise more active than usual. Most favourable reports come from the older mines. On the recommendation of Mr. John Darlington, the Burra Barroo is to be worked on the "quarrying" principle. Mr. Darlington has returned to England, to procure the necessary machinery. The Moonta and Wallaroo are yielding profitable results. The Yudanamutana telegram continued to be severely commented on by the Adelaide journals as a shameful ruse on the London Stock Exchange.

The workings at the Alameda Silver Mine are progressing satisfactorily, and from 1100 to 1200 ozs. of silver has been brought to town. A proposition to amalgamate the Wallaroo and Moonta Mines under one proprietary is now being considered. Consequently upon the intended alterations in the mode of working the Burra Mine, many miners were thrown out of employment, but the absorbed the whole number in one week. The reports from the Yorke Peninsula mines are, on the whole, very encouraging.

GOLD FIELDS MANAGEMENT.—It is now arranged that Mr. F. J. R. Spiller shall be considered Gold Fields Commissioner, having control over both the present worked diggings, though now mainly stationed at Barossa. Mr. J. R. Spiller is assisting him in surveying claims, settling disputes, and in routine work at Yatta Creek, whilst Mr. McMinn fills a similar office at Jupiter, with Mr. P. Laurence as his senior and warden of that locality. With active and efficient officers few difficulties are likely to arise.—*South Australian Register*.

SILVER ORE SPECIMENS.—Several specimens of silver ore were exhibited at the Exchange from the Potosi and Ben Lomond properties, with the results of assays attached. The Potosi specimens resemble closely the stuff now being crushed at the Alameda. One of them taken from the solid lode has yielded 78 ozs.; another, in which there is a large admixture of clay, 25 ozs. The Ben Lomond specimens are very pretty. One of them is ticketed as yielding at the rate of 26 per cent. copper and 31 ozs. silver to the ton; the other, 12 per cent. copper and 28 ozs. of silver to the ton.

AUSTRALIAN MINES.

YUDANAMUTANA COPPER.—The superintendent states (Adelaide, Oct. 12) with regard to the telegram from Galle, this unfortunate affair has caused me a great deal of trouble and uneasiness, although I cannot possibly be in any way responsible more than myself. I have ascertained that the telegram did not pass through either of the agents here. The colonial press have taken the matter up. I enclose extracts for your perusal. The worst feature is that my July letter actually reports a new discovery in the No. 3 winze. This may be regarded by yourselves and the public as confirmation of the telegram, and will tend to make the hoax more successful. I can only disclaim any knowledge of it until I hear of it from you and express my regret that it has appeared. My impression is that it was sent from London to Galle for these reasons:—1. We have clearly established that it was not sent from here by any of our telegraph agents. —2. If it had been sent by post with a remittance to cover cost enclosed with it, it would have arrived with our mail at Galle on the 11th, and the telegraph agent receiving it would at once have forwarded it, and the telegram you received would have been dated the 11th or 12th instead of the 14th. —3. The outward mail from London to Galle arrived at Galle on the 14th, no doubt conveying either a special messenger or instructions to a resident there, or a telegram, accompanied by remittance to cover cost of returning to London. I have ascertained that no Post Office order on Galle was issued here either in May or June. I have sent to Galle through the telegraph superintendent here, but I trust, for the credit of the company, that you have long since taken steps to detect the forger. Capt. Terrell reports under date of Oct. 3:—Blinnman Mine: I am very pleased to inform you that the mine is still looking exceedingly well. The lode in the bottom of No. 1 winze is just the same as last month—a splendid lode; there are large stopes of ore in this place that will last us for many months. The lode in No. 2 winze has turned out a fine lot of ore this month, but at present the lode has heaved to the west. I am very pleased to find this to be the case, for if the lode continues its present course the No. 1 lode will run into it, and should this be so there is little doubt that where the two lodes form a junction a very large mass of ore will be found. They are both at the present time two splendid lodes of ore. I am glad to inform you of the increase in this month's make of copper; made for the month, 49 tons 7 cwt. 2 qrs.; dispatched to Port Augusta, 51 tons 12 cwt. 3 qrs.; ore raised, 355½ tons; smelted, 355½ tons. By this you will perceive the ore has been much richer. Everything on the mine going on satisfactorily. We have every appearance of a splendid season before us, and had fine rains.

WORTHING.—Adelaide, Oct. 12: The sinking of Legg's shaft below the 83 is being pushed on; and, although not going down so favourably as it promised, we hope it may shortly improve, and give us fresh encouragement. In the 83 north we have cut a large stream of water, which has increased the engine one stroke per minute, and has also improved the lode, but we do not think we have yet got the north bunch, although the water is going down out of the 53 north winze. Ground driven during the month, 15 ft. 6 in.; price for driving, 10l. per fathom. In the south end, in the 83, there is no improvement. We have, therefore, taken the men away, and put them to drive south in the 73, hoping soon to meet with the lode we have in the stopes under the slide, or otherwise find the slide, where we shall be able to drive after the lode with much less cost. The 63 end we have stopped for the time, until we prove the lode in Harding's stopes, in back of the 63. Two of the 63m. level end men we put to drive in back of the 73, in the south end of Williams's stopes, under the slide, where we have a good lode going down, which we are trying to cut in the 73 south. The stopes in the 83 are not turning out so good as the level above, which is causing a falling off in the returns. This I hope we shall get over when we meet with the lode in the 93, which we have every reason to expect to be good from the appearance of the bottom of the 83, so far as we have driven. We are getting ready to sink the winze in the bottom of the 53 north. Should this hold good to the 83 it will assist us in our returns. Ore raised during the month, 150 tons; copper shipped, 23 tons 15 cwt. Ore on hand, 58 tons of 9 per cent., and regulus 22 tons of 50 per cent. Number of hands employed, 125.

PORT PHILLIP AND COLONIAL GOLD.—Mr. Bland, Clunes, Oct. 9: The quartz crushed during the four weeks of September was 5119 tons; pyrites treated, 41 tons 13 cwt. Total gold obtained 2861 oz. 15 dwts., or an average of 11 dwts. 4 grs. per ton. The receipts were 10,657 38. 1d.; payment, 4918. 1s.; profit, 6344. 2s. 4d., and to which was added a balance from last month of 2371. 14d., thereby showing an available balance of 6817. 16s. 10d. The amount divided between the two companies was 6000l. The Port Phillip Company's proportion of which amounts to 3909l. The balance of 581. 16s. 10d. was carried forward to next month's account. The return for the first two weeks of October is as follows:—Quartz crushed, 2569 tons; gold obtained, 1245 oz. 11 dwts., or an average of 9 dwts. 19 grs. per ton, without pyrites gold. Remittances 3909l.

ENGLISH AUSTRALIAN COPPER.—Adelaide, Oct. 15: The quantity of coal at Koorina was 96 tons, at Kapunda 200 tons, and at Port Adelaide 278 tons. There were three furnaces at work at Koorina, and four furnaces and one roastery at the Port works. Since the date of last advices, the 200 tons of copper mentioned therein as in course of shipment have been shipped.

YORKE PENINSULA.—The directors have advices from the committee of inspection of Adelaide, dated Oct. 13, with reports from the Kurilla Mine to the 10th. The following are extracts from Capt. Anthony's report:—"During the past four weeks six men have been employed driving the 35, east of Hall's shaft, at 6l. per fathom; distance driven, say 4 fathoms; the lode for this distance is on an average about 2 feet wide, composed of quartz, felspar, mullite, and copper ores, the latter occurring in 'pockets' on the north or 'hanging' wall of the lode, and is the richest kind of yellow ore. . . . Four men have been stopping the back of the 35 level east at 4l. 10s. per fathom; in a yielding, say, 8 tons of ore, 15 per cent. per ton. . . . At present I have about 35 tons of ore of 15 per cent. on the floors, which will be ready for sale in a week from date. . . . The engine is working well, and no difficulty is experienced in keeping the mine drained; the water is rather diminishing than otherwise." The committee write that "they have been fortunate enough to procure an inspection of the Kurilla Mine by Mr. J. Darlington, of Moorgate Chambers, Moorgate-street, an eminent mining engineer, who has recently been sent from London to inspect the Burra Mine, and of whose services the Moonta and Wallaroo proprietors have given the highest testimonials. . . . Mr. Darlington returns to England by this mail, and the directors will be able to get from him personally very useful information as to the value and prospects of their property, if well worked."

SCOTTISH AUSTRALIAN.—Sydney, dated Oct. 9, with report from the Lambton Colliery to the 7th. The assistant superintendent, Mr. M. Young, writes:—The coals shipped last month amounted to 15,006 tons, an increase of nearly 2000 tons on those for August. So far as we have gone I expect we will do about the same this month.

AUSTRALIAN UNITED GOLD.—The directors have advices from Victoria, Oct. 12. Mr. Kitto reports:—Duke of Cornwall Mine: "The whole of the works in connection with this property are progressing most satisfactorily. The engine-house is finished, except the roof. It would have been completed some time since had it been necessary, in consequence of there being no place in the immediate neighbourhood where Mr. Lamb could reside, I have commenced building a cottage on the mine on an elevated position overlooking the works. The building will always be a valuable asset, and as in all probability the Duke of Cornwall Mine will not be exhausted in the present generation the house will be very useful, seeing it will be the means of keeping an officer constantly on the mine. Sharp's shaft has now reached a depth of 75 feet, having gone through a very hard rock. The ground is much improved, and I trust to be able to report much greater progress in future. —Duke's Shaft: This is down 105 feet, with good ground. The general works for the proper future working of the mine are in good progress. You will be glad to learn that the reservoir is nearly full of water. I was fortunate in getting it finished in time to collect the spring rains." Mr. Lamb, in a letter of same date, says:—"The more I have seen of this locality the better I am satisfied of its auriferous character. I have from the first been careful not to colour too highly, as I should be very sorry to have to retract any statement, or for anything in my reports not to be borne out by facts. It will be strange indeed if our property here should be poor when the continuations of our quartz reefs at each end have been and still are so rich. You will see, upon referring to my letter of June 20, that I speak of a new shaft by Hilton and Co., and of their previous success adjoining. Last week having sunk to a depth of 140 feet, they struck veins of quartz very rich in gold, and they must be within a few feet of the rich lode from which the water drove them, at a depth of 80 ft. in their higher level shaft, the lode there dipping quickly."

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